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SPECIAL
Biological Factors
Insects

SUBJECT—

TITLE

FOREST INSECT SURVEY
EASTERN LASSEN AND SUSANVILLE AREAS
LASSEN NATIONAL FOREST, CALIFORNIA
SEASON OF 1942

Annex 1
SB
763
.C2 L3
1942

by

Philip C. Johnson and Charles B. Eaton
Berkeley, California
April 14, 1943

INDEX NO.—

U.S. GOVERNMENT PRINTING OFFICE 8—9742

Forest Insect Laboratory
Berkeley, California
April 14, 1943

FOREST INSECT SURVEY
EASTERN LASSEN AND SUSANVILLE AREAS,
LASSEN NATIONAL FOREST, CALIFORNIA

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ABSTRACT OF RESULTS

THE 1941 INFESTATION (Complete record)

Total pine timber killed in the Eastern Lassen and Susanville Areas. Lassen National Forest, California. (Table 2):

Number of trees	8,700
Volume	10,950,000 board feet
Average volume per acre	27.5 board feet
Proportion of virgin pine stand	0.2 percent

Classification: Endemic

Primary insects: Western pine beetle in ponderosa pine.
Jeffrey pine beetle in Jeffrey pine.

Trend: Decrease to one-fourth 1940 level.

Control work completed: None recommended.

THE 1942 INFESTATION (Partial record)

Classification: Endemic

Primary insects: Western pine beetle in ponderosa pine.
Jeffrey pine beetle in Jeffrey pine.

Trend: Probable over-all increase of 20 percent over 1941.

Control work recommended: None

Forest Insect Survey
EASTERN LASSEN AND SUSANVILLE AREAS
Lassen National Forest, California

INTRODUCTION

The 1942 forest insect survey of the Eastern Lassen and Susanville Areas[1] was made by the writers during the period of September 21 to October 3, and October 19 to 21, 1942. The survey is conducted annually to determine the extent of damage to pine stands caused by attacks of bark beetles and to recommend control measures where the infestation warrants. The 1942 survey secured records making it possible to complete estimates of the beetle damage which occurred in virgin pine stands during the calendar year 1941. It also measured approximately 65 to 70 percent of the 1942 damage - that which occurred and which was in evidence up to the time the survey was made.

The estimates of beetle damage which appear throughout the report rely to a great extent upon measurements made from a large number of roadside sample strips representative of the major stand types. A total of 34 strips embracing 5,024 timbered acres was used to sample the infestation in the 339,000 acres of virgin ponderosa and Jeffrey pine in the Eastern Lassen Area. The 60,000 acres of virgin pine in the Susanville Area were sampled by four strips totalling 560 acres. The relative location of the strips is shown in Figure 2. The effectiveness of these strips as a sampling medium has not yet been fully determined, but their use in 1942 made it possible to obtain a more equitable coverage in the Eastern Lassen Area and to extend the intensive survey to the Susanville Area even in the face of a critical shortage of manpower.

Estimates of the virgin and cutover pine acreages have been corrected to January 1, 1942, with the assistance of the Supervisor's staff of the Lassen National Forest.

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1. The reporting areas are made up of the following entomological units, (see Figure 2):

Eastern Lassen Area

Coble Mountain	Butte Creek	Stephens Ranch
Dixie Valley	Halls Flat	Crater Mountain
Nigger Spring	Black's Mountain	Logan Mountain
Beaver Creek	Harvey Valley	Campbell Butte
Straylor Lake	Cave Mountain	Merrill Flat
Gordon Valley	Bogard Buttes	Brockman Flat

Susanville Area

Robbers Creek	Merrillville	Willard Creek
Susan River	Mountain Meadows	Diamond Mountain
Piute Creek	Coppervale	

THE 1941 INFESTATION

Insects Involved.

The western pine beetle, Dendroctonus brevicomis Lec., continued its primary role in ponderosa pine. The basal examinations of the trees killed by this insect revealed its attacks to be weak and seemingly less aggressive than in previous years. Phloem areas were often shared with the attacks of secondary insects, principally those of the emarginate engraver beetle, Ips emarginatus Lec. In some of the infested trees examined, large areas of phloem in the butt logs were devoid of any insect attacks though there were evidences of attacks in the bole regions above.

In Jeffrey pine the attacks of the Jeffrey pine beetle, Dendroctonus jeffreyi Hopk., were aggressive and successful in developing heavy broods.

The only other forest insect pest of any importance was a weevil, Cylindrocopturus eatoni Buch., infesting and killing pine seedlings in widely scattered locations throughout the forest. Except for one small concentration in a cutover pine reserve stand near Harvey Valley Guard Station, the damage to natural reproduction caused by this insect was of minor importance.

Pine Mortality on the Sample Strips.

The ponderosa and Jeffrey pines attacked in 1941 and 1942 were located, examined, and marked on each of the 38 roadside strips used by the survey. This gave a fairly accurate cross-section of the infestation in most all parts of the two reporting areas. The mortality thus measured is shown in Table 1, a summary of which is given below:

Summary of Table 1: Pine timber killed on sample strips - 1941.

Occurrence[1]	B.m. Per Acre			Percent of Stand		
	PP[2]	JP[3]	SP[4]	PP	JP	SP
Maximum	88.1	82.5	none	10.2	1.9	none
Minimum	none	none	none	none	none	none
Average	19.7	11.6	none	0.6	0.3	none

1. The figures opposite each of the three occurrence categories are not necessarily from the same strip.
2. Basis: Ponderosa pine, 36 strips, 5,264 acres.
3. Basis: Jeffrey pine, 35 strips, 5,104 acres.
4. Basis: Sugar pine, 1 strip, 160 acres.

The variation in mortality between adjacent strips was sometimes considerable, but enough strips were usually located in each forest area to serve as the basis for a reasonable average mortality estimate for that area. The average of 31 board feet per acre of ponderosa and Jeffrey pine killed on all the strips is slightly higher than the estimated 28 board feet per acre killed in all pine stands of the two reporting areas. This is due in part to the fact that many of the strips were later found to be sampling areas of heavier infestations.

The field data from the roadside strips disclosed two localities where the infestation in 1941 was higher than average. One was made up of the pine stands of the Dixie Valley, Straylor Lake, Black's Mountain, and Harvey Valley units of the Eastern Lassen Area. The pine mortality here averaged 49 board feet per acre, still endemic but very nearly equalling the estimated annual growth of these stands. The other area was in the Susanville Area in the stands of the Susan River and Willard Creek units where the mortality for the year averaged 57 board feet per acre.

The 1941 infestation occurred in both ponderosa and Jeffrey pine stands as widely scattered single trees. Both the western pine and Jeffrey pine beetles expressed a high degree of selectivity in their choice of host trees. In nearly every case, the trees attacked by these beetles were definitely among the most weakened trees in the stand as evidenced by external appearances of the crowns. Many of them had been topkilled before by other insects or had suffered mechanical damage from lightning and wind.

Estimated Pine Mortality by Forest Areas.

The rate of mortality from beetle attacks was unusually low in 1941, but, notwithstanding this, the total estimated damage from this source reached significant figures in both reporting areas. The damage estimated for each entomological unit as well as that for each area is given in Table 2. In the following summary of this table, both the total mortality estimates and the distribution of the mortality between the two major pine species is shown.

Summary of Table 2: Virgin pine timber killed by bark beetles - 1941.

Area	Tree Species	No. of Trees	Volume b.m.	Percent of Stand
Eastern Lassen	PP	5,560	6,040,000	0.2
	JP	2,020	2,860,000	0.3
	PP-JP	7,580	8,900,000	0.2
Susanville	PP	360	560,000	0.1
	JP	760	1,490,000	0.5
	PP-JP	1,120	2,050,000	0.4
Total of Both Areas	PP	5,920	6,600,000	0.2
	JP	2,780	4,350,000	0.3
	PP-JP	8,700	10,950,000	0.2

Despite the fact that ponderosa pine is more abundant in the stands of both Lassen areas, these figures indicate that from 0.3 to 0.5 percent of the Jeffrey pine stands were killed as compared with 0.2 percent for ponderosa pine; also, that the volume of Jeffrey pine killed in the Susanville Area was nearly three times that of ponderosa pine. The intensity of Jeffrey pine losses seemed to increase from the low endemic status of the Eastern Lassen Area to a higher level in the Susanville Area, finally culminating in an epidemic stage in the Eastern Plumas Area of the Plumas National Forest[1] contiguous to the southeast.

1. Johnson, Philip C. and Charles B. Eaton. Forest insect survey, Season of 1942, Plumas National Forest, California. Report of the Forest Insect Laboratory, Berkeley, California. December 16, 1942.

Trend of the Infestation.

There has been a gradual decline in the intensity of the beetle infestations in the Eastern Lassen Area since the peak year of 1934, broken only by the slight increases recorded in 1939 and 1940 (Figure 1). The 1941 infestation was the lowest, both in the rate and the amount of timber killed in the larger forest areas, since the beginning of the annual surveys in 1930. The downward trend of the rate shown in Figure 1 has been effected mostly by the greatly improved climatic conditions of the past few years.

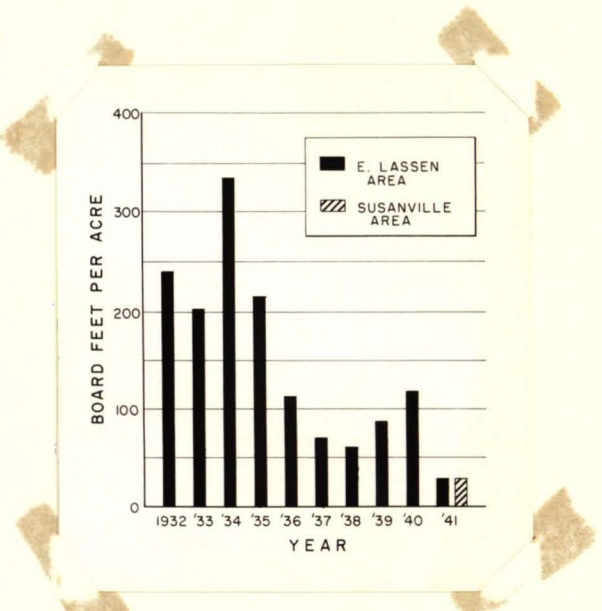


Figure 1. Trend of the bark beetle infestation rate in the Eastern Lassen Area, Lassen National Forest, 1932 to 1941, inclusive.

The decline in total pine losses in the entomological units and the larger areas has been due partially to the lowering rate of losses and to the gradual diminishing of the virgin stands as the result of logging activities.

A similar trend record was begun in the Susanville Area in 1941, but it is expected that the remaining virgin pine will be utilized before any records covering an extended period of years can be made.

THE 1942 INFESTATION

The 1942 infestation was very similar in character to the 1941 infestation. The same insects played the same roles and the type of trees attacked and the manner in which they were distributed through the forest was almost identical. In the Eastern Lassen Area, the scene of heaviest mortality appeared to have shifted eastward to a zone about one township in width extending from Merrill Flat northward to Slate Mountain, thence westward to Straylor Lake. In the Susanville Area the heaviest losses were still to be found in the Susan River and Willard Creek units.

The 1942 infestation records will not be completed until the 1943 survey is made, but on the basis of the 65 to 70 percent cruised in the 1942 survey it appears that the losses for the full calendar year 1942 will be about 20 percent above the 1941 level.

INSECT CONTROL RECOMMENDATIONS

The 1942 infestation appears to be at a very low ebb everywhere throughout both of the Lassen Areas and no control measures are warranted.

Fortunately, the current logging operations of the Red River Lumber Company and the Fruit Growers Supply Company were located in areas where the infestation was greatest in 1941 and 1942 so that, in effect, a minor form of insect control was realized. As long as the war continues, it will be difficult to justify any insect control measures which take away men or equipment from the full-time job of getting out logs for the ever-growing wartime uses of wood. Barring any unforeseen beetle epidemics of disastrous proportions, about all that can be hoped for now in the way of insect control is the orderly gravitation of logging operations to areas of high beetle hazard, or the more sudden shifting of operations to areas of heavy current infestation.

Table 1 - Pine timber killed by bark beetles on virgin sample strips, Eastern Lassen and Susanville Areas, Lassen National Forest, California, and adjacent private lands. Season of 1941.

EASTERN LASSEN AREA

ENTOMOLOGICAL UNIT	"RD" STRIP NO.	TIMBERED ACREAGE	INSECT HAZARD RATING	PINE STAND TREE SPP.	PINE STAND VOLUME (m.b.m.)	TIMBER KILLED IN 1941 NO. OF TREES	TIMBER KILLED IN 1941 VOLUME (b.m.)	TIMBER KILLED IN 1941 VOLUME PER ACRE	TIMBER KILLED IN 1941 % OF STAND
Coble Mountain	1	160	V	PP	670	1	640	4.0	0.1
				JP	110	2	1,970	12.3	1.8
				Total	780	3	2,610	16.3	0.3
	2	160	V	PP	670	3	2,410	15.1	0.4
				JP	110	none	none	none	none
				Total	780	3	2,410	15.1	0.3
Dixie Valley	20	96	V	PP	160	2	1,800	18.8	1.1
				JP	350	1	1,650	17.2	0.5
				Total	510	3	3,450	36.0	0.7
	21	80	V	PP	550	2	90	1.1	none
				JP	90	none	none	none	none
				Total	640	2	90	1.1	none
	25	80	V	PP	370	2	3,140	39.3	0.8
				JP	270	1	340	4.3	0.1
				Total	640	3	3,480	43.6	0.5
Nigger Spring	4	160	IV	PP	40	3	4,060	25.4	10.2
				JP	1,170	4	5,490	34.3	0.5
				Total	1,210	7	9,550	59.7	0.8
	5	160	IV	PP	1,680	1	1,390	8.7	0.1
				JP	610	none	none	none	none
				Total	2,290	1	1,390	8.7	0.1

Table 1. (continued)

EASTERN LASSEN AREA

ENTOMOLOGICAL UNIT	"RD" STRIP NO.	TIMBERED ACREAGE	INSECT HAZARD RATING	PINE STAND TREE SPP.	PINE STAND VOLUME (m.b.m.)	TIMBER KILLED IN 1941 NO. OF TREES	TIMBER KILLED IN 1941 VOLUME (b.m.)	TIMBER KILLED IN 1941 VOLUME PER ACRE	TIMBER KILLED IN 1941 % OF STAND
Beaver Creek	3	160	IV	PP	780	1	1,790	11.2	0.2
				JP	620	1	1,820	11.4	0.3
				Total	1,400	2	3,610	22.6	0.3
	6	160	III-IV	PP	440	none	none	none	none
				JP	820	2	2,930	18.3	0.4
				Total	1,260	2	2,930	18.3	0.2
Straylor Lake	16	160	IV	PP	450	2	6,130	38.3	1.4
				JP	1,530	1	2,050	12.8	0.1
				Total	1,980	3	8,180	51.1	0.4
	17	144	IV	PP	1,210	13	9,850	68.4	0.8
				JP	130	1	1,210	8.4	0.9
				Total	1,340	14	11,060	76.8	0.8
	18	80	III-IV	PP	760	6	4,590	57.4	0.6
				JP	50	none	none	none	none
				Total	810	6	4,590	57.4	0.6
	19	160	IV	PP	1,160	7	14,090	88.1	1.2
				JP	350	3	5,180	32.4	1.5
				Total	1,510	10	19,270	120.5	1.3
Gordon Valley	22	160	IV	PP	1,340	7	6,670	41.7	0.5
				JP	550	none	none	none	none
				Total	1,890	7	6,670	41.7	0.4
	23	160	III	PP	3,210	3	3,220	20.1	0.1
				JP	550	3	1,760	11.0	0.3
				Total	3,760	6	4,980	31.1	0.1

Table 1. (continued)

EASTERN LASSEN AREA

ENTOMOLOGICAL UNIT	"RD" STRIP NO.	TIMBERED ACREAGE	INSECT HAZARD RATING	PINE STAND TREE SPP.	PINE STAND VOLUME (m.b.m.)	TIMBER KILLED IN 1941 NO. OF TREES	TIMBER KILLED IN 1941 VOLUME (b.m.)	TIMBER KILLED IN 1941 VOLUME PER ACRE	TIMBER KILLED IN 1941 % OF STAND
				PP	1,600	2	3,400	22.4	0.2
Gordon Valley	24	152	III-IV	JP	910	2	1,820	12.0	0.2
				Total	2,510	4	5,220	34.4	0.2
				PP	1,030	none	none	none	none
	26	160	III-IV	JP	710	none	none	none	none
				Total	1,740	none	none	none	none
				PP	530	none	none	none	none
Butte Creek	8	160	III	JP	1,270	1	1,950	12.2	0.2
				Total	1,800	1	1,950	12.2	0.1
				PP	360	1	700	4.4	0.1
	9	160	III	JP	1,410	none	none	none	none
				Total	1,770	1	700	4.4	0.1
				PP	1,690	none	none	none	none
	10	160	III	JP	1,280	3	9,170	57.3	0.7
				Total	2,970	3	9,170	57.3	0.3
Halls Flat	7	160	III	JP	1,010	1	1,440	9.0	0.1
				PP	620	2	2,930	18.3	0.5
	29	160	III-IV	JP	760	2	2,940	18.4	0.4
				Total	1,380	4	5,870	36.7	0.4
				PP	870	3	2,260	28.3	0.3
Harvey Valley	27	80	IV	JP	370	none	none	none	none
				Total	1,240	3	2,260	28.3	0.2
				PP	2,280	3	4,060	25.4	0.2
	31	160	IV	JP	220	1	1,390	8.7	0.6
				Total	2,500	4	5,450	34.1	0.2

Table 1. (continued)

EASTERN LASSEN AREA

ENTOMOLOGICAL UNIT	"RD" STRIP NO.	TIMBERED ACREAGE	INSECT HAZARD RATING	PINE STAND TREE SPP.	PINE STAND VOLUME (m.b.m.)	TIMBER KILLED IN 1941 NO. OF TREES	TIMBER KILLED IN 1941 VOLUME (b.m.)	TIMBER KILLED IN 1941 VOLUME PER ACRE	TIMBER KILLED IN 1941 % OF STAND
Cave Mountain	28	160	IV-V	PP	1,920	2	3,740	23.4	0.2
				JP	480	1	1,020	6.4	0.2
				Total	2,400	3	4,760	29.8	0.2
	32	160	IV	PP	1,660	2	960	6.0	0.1
Bogard Buttes	11	160	III	PP	470	1	2,610	16.3	0.6
				JP	2,060	1	2,610	16.3	0.1
				Total	2,530	2	5,220	32.6	0.2
	12	160	III	PP	3,150	2	1,660	10.4	0.1
				JP	440	none	none	none	none
				Total	3,590	2	1,660	10.4	0.1
	13	160	III	PP	2,370	2	930	5.8	none
				JP	150	none	none	none	none
				Total	2,520	2	930	5.8	none
Stephens Ranch	14	160	III	PP	2,650	1	290	1.8	none
	15	160	III	JP	3,080	1	2,260	14.1	0.1
Crater Mountain	30	152	III-IV	PP	2,300	2	1,120	7.4	none
				JP	240	none	none	none	none
				Total	2,540	2	1,120	7.4	none
Merrill Flat	33	160	III-IV	PP	2,630	2	4,530	28.3	0.2
				JP	180	none	none	none	none
				Total	2,810	2	4,530	28.3	0.2
	34	160	III-IV	PP	1,600	1	2,510	15.7	0.2
				JP	610	2	1,060	6.6	0.2
				SP	400	none	none	none	none
				Total	2,610	3	3,570	22.3	0.1

Table 1. (continued)

SUSANVILLE AREA

ENTOMOLOGICAL UNIT	"RD" STRIP NO.	TIMBERED ACREAGE	INSECT HAZARD RATING	PINE STAND TREE SPP.	PINE STAND VOLUME (m.b.m.)	TIMBER KILLED IN 1941 NO. OF TREES	TIMBER KILLED IN 1941 VOLUME (b.m.)	TIMBER KILLED IN 1941 VOLUME PER ACRE	TIMBER KILLED IN 1941 % OF STAND
				PP	860	3	6,400	40.0	0.7
Willard Creek	35	160	III-IV	JP	1,570	none	none	none	none
				Total	2,430	3	6,400	40.0	0.3
				PP	560	none	none	none	none
	36	80	III	JP	340	3	6,600	82.5	1.9
				Total	900	3	6,600	82.5	0.7
				PP	1,840	none	none	none	none
Merrillville	37	160	IV	JP	10	1	64	0.4	0.6
				Total	1,850	1	64	0.4	none
	38	160	III	PP	1,560	2	2,610	16.3	0.2

Table 2. Virgin pine timber killed by bark beetles, Eastern Lassen and Susanville Areas, Lassen National Forest, California, and adjacent private lands. Season of 1941.

EASTERN LASSEN AREA

ENTOMOLOGICAL UNIT	PINE TYPE ACREAGE (January 1, 1942)			VIRGIN PINE STAND		TIMBER KILLED 1941			
						Trees	VOLUME		
	Virgin	Cutover	Total	SPP.	(m.b.m.)	No.	m.b.m.	b.m./a.c.	% Stand
Coble Mtn.	20,490	1,020	21,510	PP	105,750	270	200	9.6	0.2
				JP	11,010	140	130	6.2	1.3
Dixie Valley	17,450	-	17,450	PP	86,730	400	410	23.5	0.5
				JP	41,760	160	150	8.6	0.4
Nigger Spring	14,830	-	14,830	PP	73,110	190	250	17.1	0.4
				JP	86,320	190	250	17.1	0.3
Beaver Creek	23,670	4,710	28,380	PP	153,100	90	180	7.5	0.1
				JP	58,780	190	320	13.7	0.5
Straylor Lake	28,840	1,230	30,070	PP	199,040	1,620	1,820	63.1	0.9
				JP	100,320	230	390	13.4	0.4
Gordon Valley	34,410	610	35,020	PP	324,340	650	730	21.1	0.2
				JP	125,450	280	200	5.7	0.2
Butte Creek	27,260	-	27,260	PP	226,660	50	40	1.4	0.1
				JP	182,460	160	470	17.4	0.3
Halls Flat	11,320	-	11,320	PP	17,300	50	70	6.1	0.4
				JP	76,210	120	170	15.2	0.2
Blacks Mtn.	28,410	1,840	30,250	PP	325,380	770	940	33.0	0.3
				JP	122,960	170	280	10.0	0.2
Harvey Valley	17,370	10,650	28,020	PP	212,660	500	470	26.9	0.2
				JP	31,540	50	80	4.4	0.3
Cave Mtn.	14,300	5,120	19,420	PP	129,080	190	210	14.7	0.2
				JP	33,490	40	50	3.2	0.1
Bogard Buttes	25,200	-	25,200	PP	284,680	250	220	8.6	0.1
				JP	119,950	50	100	4.1	0.1
Stephens Ranch	27,760	-	27,760	PP	405,150	80	30	0.9	0.1
				JP	12,440	80	190	7.0	1.5
Crater Mtn.	10,050	9,420	19,470	PP	137,720	130	70	7.4	0.1
				JP	24,060	none	none	none	none

Table 2. (continued)

EASTERN LASSEN AREA

ENTOMOLOGICAL UNIT	PINE TYPE ACREAGE (January 1, 1942) Virgin	Cutover	Total	VIRGIN PINE STAND Spp.	(m.b.m.)	TIMBER KILLED 1941 Trees No.	VOLUME m.b.m.	b.m./a.c.	% Stand
Logan Mtn.	1,120	11,880	13,000	PP	11,590	10	10	10.3	0.1
				JP	10,050	none	none	none	none
Campbell Butte	7,720	16,080	23,800	PP	79,140	100	60	7.4	0.1
				JP	17,320	none	none	none	none
Merrill Flat	18,060	8,290	26,350	PP	191,190	180	300	16.4	0.2
				JP	49,010	130	60	3.3	0.1
				SP	33,840	none	none	none	none
Brockman Flat	10,590	-	10,590	PP	6,070	30	30	2.9	0.5
				JP	23,570	30	20	2.2	0.1
				PP	2,968,690	5,560	6,040	17.8	0.2
SUBTOTAL	338,850	70,850	409,700	JP	1,126,700	2,020	2,860	8.4	0.3
				SP	33,840	none	none	none	none

SUSANVILLE AREA

Robbers Creek	9,830	31,740	41,570	PP	12,340	none	none	none	none
				JP	135,050	60	140	14.1	0.1
Susan River	8,840	21,600	30,440	PP	90,550	40	90	10.0	0.1
				JP	28,300	90	180	20.6	0.6
Willard Creek	19,970	1,860	21,830	PP	104,670	120	270	13.3	0.3
				JP	112,910	520	1,100	55.0	1.0
Merrillville	21,070	720	21,790	PP	195,760	200	200	9.3	0.1
				JP	35,470	90	70	3.4	0.2
SUBTOTAL	59,710	55,920	115,630	PP	403,320	360	560	9.4	0.1
				JP	311,730	760	1,490	25.0	0.5
TOTALS OF ABOVE TWO AREAS	398,560	126,770	525,330	PP	3,372,010	5,920	6,600	16.6	0.2
				JP	1,438,430	2,780	4,350	10.9	0.3
				SP	33,840	none	none	none	none
				All SPP.	4,844,280	8,700	10,950	27.5	0.2

Figure 2

UNITED STATES DEPARTMENT OF AGRICULTURE

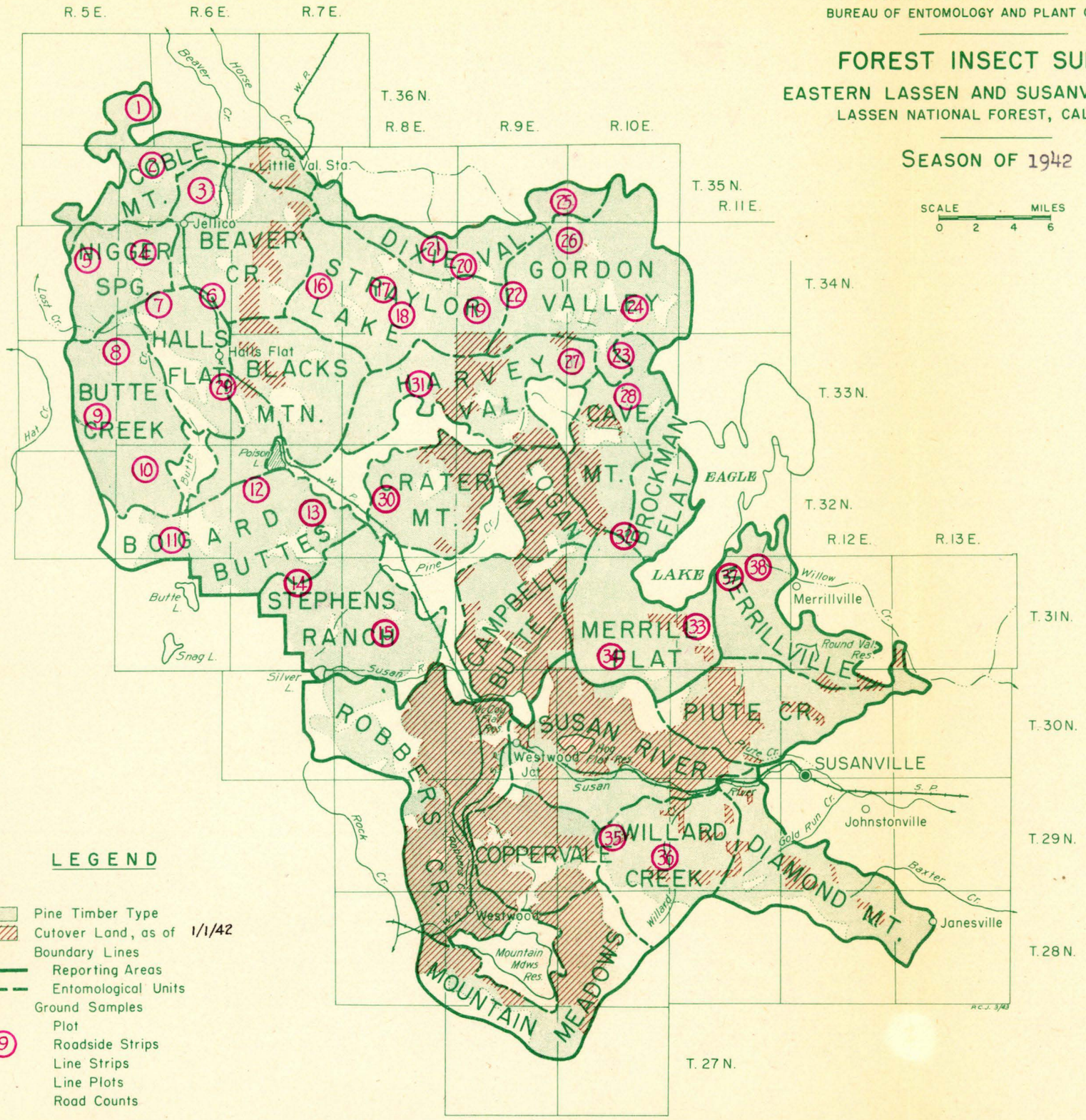
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

FOREST INSECT SURVEY

EASTERN LASSEN AND SUSANVILLE AREAS

LASSEN NATIONAL FOREST, CALIFORNIA

SEASON OF 1942



LEGEND

- Pine Timber Type
- Cutover Land, as of 1/1/42
- Boundary Lines
  - Reporting Areas
  - Entomological Units
- Ground Samples
  - Plot
  - (9) Roadside Strips
  - Line Strips
  - Line Plots
  - Road Counts